

Abstract Submitted  
for the MAR05 Meeting of  
The American Physical Society

**Atomic force microscopy electrostatic nanolithography on self-assembled monolayer of organo-mercaptan molecules** MICHAEL A. REAGAN<sup>1</sup>, OLGA V. MAYEVSKA, PAVEL B. PARAMONOV, SERGEI F. LYUKSYUTOV, Departments of Physics, Chemistry and Polymer Engineering, The University of Akron, OH 44325, SHANE JUHL, RICHARD A. VAIA, AF Research Laboratory, OH 45433, KAZUO UMEMURA, Musashi Institute of Technology, Japan — We report a *novel* technique for manipulating SAM molecules at the nanoscale. An initial stage, the AFM probe induces local modification of the self-assembled monolayer involving cleavage of the sulfur-metal bond. This leads to depressions appearing on the surface's topography images followed by the removal (diffusion) of the desorbed specie. It is known from the macroscopic scale electrochemical experiments that oxidative desorption of the organo-mercaptans from the gold surface takes place at potentials greater than +0.8 V (vs. Ag/AgCl) in aqueous KOH solutions. This corresponds to about -3.9 V in the absolute potential scale. A weak positive bias of the metal substrate is expected to result in the dissociative electron transfer from the mercaptan to the gold, taking place in the surface region localized near the scanning probe tip, where the water can be condensed from the ambient environment forming a nanoscale electrochemical cell.

<sup>1</sup>presenter

Sergei F Lyuksyutov  
The University of Akron

Date submitted: 22 Dec 2004

Electronic form version 1.4